

North American Drought Monitor - March 2012

CANADA: Exceptionally warm weather throughout March coast to coast accelerated the arrival of spring. Lower than normal snowpack throughout much of the country resulted in low runoff and accelerated the drying of soils. Some significant spring storms occurred in many of the drought regions reducing the severity and extent in many locations; the overall the extent of drought across the country was reduced from February. The most significant drought remained in central Alberta and southern Manitoba. Dry conditions took hold in southern Ontario, and stayed consistent in Eastern Canada. Looking ahead to June, temperatures are forecast to be above normal everywhere except British Columbia, which is to be below normal. The three month precipitation forecast from April to June calls for below normal precipitation across the Canadian agricultural region however, precipitation is very difficult to predict.

The Prairie Provinces had negligible snow cover all winter which quickly disappeared in March with daily highs up to 10 degrees above normal. That is a sharp contrast to March 2011 where above normal snowfall brought tremendous spring runoff and flooding through the spring season. This season central Alberta and west-central Saskatchewan are dealing with Severe Drought (D2) conditions due to the lack of winter snowfall. Sloughs and dugouts dependant on runoff did not fill up, and pastures remained very dry. Since September 1, 2011 the region is short more than 100 mm (4 in) of precipitation. That level of departure is significant for the region which normally receives about 400 mm (16 in) yearly. Mountain snowpack in the Rockies was above normal, with will result in good streams flow through the summer.

The Peace River region of northwest Alberta remained classified D1. Over the past six months much of the region has had only 40-60% of normal precipitation, and in March some areas received less than 40%. The region had a respite from its multi-year drought last summer when rainfall was above normal, but long term impacts continue and more severe drought conditions could develop quickly without some timely spring rainfall.

In Manitoba, a significant rain/snow mix in later March brought some much needed moisture to parts of the southern and central regions. The runoff from the spring storms helped to fill dugouts. As a result, the D1 area was reduced. However, areas surrounding Winnipeg remained over 100 mm (4 in) short of precipitation since September 2011, and remained classified D1. Producers in the region continued to haul water for cattle where shallow wells have been dry since late December. Also, many rivers across southern Manitoba had already reached their spring runoff peak and began receding by late March; an unusual occurrence brought about by the lack of snow cover over the winter. Low lake water levels were also reported across the eastern region.

In British Columbia, the moderate drought (D1) area in the central interior was reduced to encompass the northern portion of the Okanagan region. Mountain snowpack recovered in March to be about 90% of normal, up from 75% of normal in February. Approximately 90% of the winter snow pack has accumulated, which is a good sign for

keeping water supplies up through the often dry summer season. The region will however continue to be monitored closely for developing drought.

In Ontario, daily highs in March approached 26°C in some places, scoring the previous records. The exceptionally warm weather brought an early start to spring seeding in some areas, but also brought on drought conditions. Southwest Ontario along Lake Huron was classified D1 (Moderate Drought) where precipitation since November 2011 has been very sparse; record dry for some places. Northwest Ontario remained in long term drought (D1) with some places at less than 50% of normal all winter. Local Conservation Authorities maintained the Level 1 and Level 2 Low Water Conditions in the region. Similar to the Prairies, snowfall has been sparse over this northern boreal region which could bring an early start to the fire season next year if the forest remains dry.

Western New Brunswick and the Gaspé region of Quebec continued to be classified abnormally dry where precipitation remained less than 75% of normal over the past six months. To date there has been minimal impact, but the region will continue to be monitored closely.

Long term drought was alleviated in the Lake Athabasca region of northern Alberta and Saskatchewan, leaving the region classified D0 from D1, where winter precipitation was higher than expected.

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- Manitoba Water Stewardship
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- Ontario Ministry of Natural Resources – Aviation, Forest Fire and Emergency Services
- Saskatchewan Ministry of Agriculture
- Saskatchewan Watershed Authority
- Saskatchewan Environment Fire Management and Forest Protection Branch

UNITED STATES: During March, a persistent weather pattern led to record and near-record breaking temperatures that enveloped the eastern two-thirds of the Nation, contributing to the warmest March on record (since 1895). Every state in the Nation experienced a record warm daily temperature during March. Preliminary data indicated 15,272 warm daily temperature station records were broken (7,755 daytime and 7,517 nighttime records), with hundreds of locations breaking their all-time March records. Every state east of the Rockies experienced a top ten March average temperature, with 25 states observing their warmest March ever. Monthly temperatures averaged at least 15

degrees F above normal at numerous Midwestern locations, while subnormal readings were limited to the Pacific Coast States.

Although the Nation noted its wettest March since 1998, little or no precipitation fell in a swath from the Southwest to eastern Montana and the western Dakotas. Unusually dry weather also prevailed in the Northeast and across Florida's peninsula. In contrast, March storminess nearly doubled the water content of the high-elevation Sierra Nevada snow pack, slightly improving California's water supply outlook. In the remainder of the West, the water supply outlook was mixed. The Southwest suffered from mostly subnormal snow packs and reservoirs while the Northwest had abundant snow packs and favorable reservoir levels. Elsewhere, March wetness gradually diminished the long-term drought across the south-central U.S. while showers provided beneficial moisture in the Southeast. Drought-related concerns, however, persisted in several areas including the southern High Plains and lower Southeast.

The frequent development of cold upper-level systems over the West and the lack of frequent and persistent cold outbreaks in the East, similar to conditions last month and for much of this winter, is consistent with a positive Arctic Oscillation and positive North Atlantic Oscillation. The unseasonably mild weather in the eastern U.S. also created an environment favorable for severe thunderstorms and tornadoes. According to NOAA's Storm Prediction Center, there were 223 preliminary tornadoes reported during March (average=80). The majority of the twisters occurred during March 2-3 across the Ohio Valley and Southeast which caused 40 fatalities and damages exceeding \$1.5 billion U.S. dollars. In addition, winter wheat and fruit crops east of the Rockies developed several weeks ahead of the normal schedule, leaving many commodities vulnerable to spring freezes. By March 26-27, the first of many cool snaps occurred in the lower Great Lakes region and the Northeast, requiring producers to monitor fruit crops for any signs of freeze injury.

In early March, exceptionally heavy rains and severe weather soaked parts of Hawaii, especially Kauai and Oahu, due to the passage of a cut-off low pressure system. A rare EF0 tornado hit Lanikai and Kailua on Oahu causing minor damage, while a separate storm dropped a hailstone in Kaneohe measuring 4.25 inches long, 2.25 inches tall, and 2 inches wide, the largest hailstone on record for the state. In Alaska, early March cold weather followed late February snowfalls in the mainland. In Valdez, the season-to-date snowfall on March 7 reached 426 inches, or 156 percent of normal. Snow also blanketed parts of the Aleutians as Cold Bay recorded its second snowiest March (43.3 inches) and second wettest March (7.13 inches). Later in the month, temperatures rebounded to near- and above-normal levels as Fairbanks reached the freezing mark for the first time this year on March 27. Despite the late month thaw, both Nome and Kotzebue completed their second coldest March in the past 30 years.

Short-term moderate to severe drought (D1 to D2) rapidly expanded in the Northeast, rising from 0.5% on Feb. 28 to 9.9% on Apr. 3 to 27.7% a week later, according to the U.S. Drought Monitor. Moderate to exceptional drought (D1 to D4) remained fairly constant in the Southeast (58.8%) and Midwest (19.7%) from Feb. 28 to Apr. 3, but

greatly improved in the South (from 55.2% to 35.6%). Some slight increase in the D1 to D4 coverage occurred in the West and High Plains during the past 5 weeks, with percentages at 48.7 and 23.2, respectively. Although D0-D4 covered approximately 60% of the contiguous U.S., the extreme to exception drought category (D3-D4) areas continued to shrink, down to 6.6% in early April. The core drought areas in the U.S. as of April 3 included:

- 1) a large area of D1 to D4 from the Southwest and Great Basin eastward into the south-central High Plains;
- 2) D1 to D4 in the eastern Gulf and southern Atlantic Coast States;
- 3) moderate to severe drought (D1 to D2) in the upper Midwest;
- 4) expanding areas of D0 and D1 in the Northeast;
- 5) D1 to D3 on leeward sides of Hawaii (except Kauai and Oahu);

Historical Perspective: NCDC's March 2012 *State of the Climate* report noted that the average temperature in the contiguous U.S. of 51.1 degrees F was 8.6 degrees F above the 20th century average for March, and 0.5 degrees F greater than the previous warmest March in 1910. Of the more than 1,400 months that have passed since the U.S. record began, only January 2006 had a larger departure from normal average temperature than March 2012. Cool conditions were limited to the Pacific Coast States where Washington reported its 35th coldest March. The 25 states which set record March warmth occurred from the central Plains to the East Coast, including all of the Midwest. The first 3-months of 2012 have also been exceptionally warm, with 25 states east of the Rockies observing their warmest January-March on record, with an additional 16 states ranked in the top ten. No state in the contiguous U.S. had 3-month temperatures below normal.

The nationally averaged precipitation total was 2.73 inches, which is 0.33 inch above normal. The Pacific Northwest and southern Plains were much wetter than normal while drier than average conditions were observed in the interior West, Northeast, and Florida. March state ranking ranged from the driest in Colorado to the second wettest in Oregon. Top ten values for March wetness included Washington, Idaho, Texas, Oklahoma, and Louisiana. In contrast, top ten values for March dryness were found in Wyoming, South Dakota, Delaware, New Jersey, Connecticut, Rhode Island, and Massachusetts. Precipitation for the first 3-months of 2012 was 0.29 inch below the long-term average. Similar to March, states in the Pacific Northwest and southern Plains were wetter than normal, while the Intermountain West, parts of the Ohio Valley, and the entire Eastern Seaboard were drier than average.

Agricultural and Hydrological Highlights: On April 1, the U.S. Department of Agriculture reported that 58% of the Nation's winter wheat crop was rated good or excellent, while only 12% was rated poor or very poor. A year ago, those numbers were 37 and 32%, respectively. Since the fall, crop conditions have improved on the southern Great Plains as winter and early spring storms brought moisture to Kansas, Oklahoma, and Texas. A comparison in these 3 states depicted a complete reversal from conditions a year ago. The percent rated good to excellent in 2011 vs 2012 was: Kansas 31 vs 60; Oklahoma 16 vs 75; and Texas 12 vs 34. The percent rated poor to very poor in 2011 vs 2012 was: Kansas 31 vs 8; Oklahoma 53 vs 6; and Texas 61 vs 33. In contrast, an

unusually dry winter on the northern Great Plains left many wheat fields without a protective snow cover and lacking a significant moisture supply as the crops emerged from dormancy. According to the U.S. Department of Agriculture, corn growers intend to plant 95.9 million acres of corn for all purposes which would be the highest planted acreage in the U.S. since 1937 when an estimated 97.2 million acres were planted. Favorably warm weather this year across most of the corn-producing regions promoted an early start to spring fieldwork, leaving progress slightly ahead of normal in half of the major corn producing states. Despite the opportunity to plant early, producers in some locations remained hesitant out of concern for a spring freeze. The average level of Lake Okeechobee in south Florida was about a foot higher than a year ago, but was still nearly 2 feet below normal.

April 1 mountain snowpack in the West, a crucial water supply during the following melt season, was near to above-normal across the northern third of the West (Washington, western Oregon, northern Idaho, and western Montana), but was below normal elsewhere. This was especially true in California's southern Sierra Nevada, Nevada, Utah, southern Idaho, Colorado, Arizona, and New Mexico where the April 1 snowpack was less than 50%. Fortunately, April 1 reservoir storage was near or above-normal in the nine of the eleven Western states (except Arizona and New Mexico). At the end of March, California's 154 intrastate reservoirs cumulatively held 105% of their normal volume of water. The water content of the high-elevation Sierra Nevada snow pack (a key watershed for the state's network of reservoirs) nearly doubled from a month ago, but still stood at 15.2 inches, or 53% of normal, with northern sections faring better than southern portions.

MEXICO: During March 2012, there was a weakening in the jet stream that favored the entry of moist air from the Pacific to the Central and Northeast in February. Now, rainfall was normal to above normal in parts of Coahuila, and Central and Southern Mexico. An average of 14 mm (0.55 in) of rain was received nationwide, 5% below March's average of 14.8 mm (0.58 in) according to records since 1941. The mean temperature was 11.6 °C (52.88 °F), 0.6 °C above normal (1971-2000); statistically it was the tenth warmest March since 1971.

According to preliminary data, the March rains were much below average (in the top ten driest) for five states (Colima, Nayarit, Sinaloa, Tabasco and Yucatan) and another five were ranked in the top ten wettest (Campeche, Coahuila, Mexico City, Michoacan and Tlaxcala). Over the last three months (January-March 2012) Sinaloa and Sonora remains in the top ten driest, but the beneficial rains since February allowed moisture to recover in sixteen states: Tamaulipas, Tlaxcala, Veracruz and Federal District were among the five wettest. However over the last six months the moisture deficit is worrisome in Sinaloa, Nayarit and Oaxaca, which were ranked among the ten top driest, and only Federal District and Colima were classified in the top ten wettest from October 2011 to March 2012. Over one year, ten states were ranked in the top ten driest including Aguascalientes, Baja California Sur, Coahuila, Chihuahua, Durango, Guanajuato, Jalisco,

Nuevo Leon, Sinaloa and Zacatecas. Of those, Durango and Zacatecas were classified as the record driest. Colima and Chiapas were the second the seventh wettest, respectively.

The monthly mean temperature was warmer than normal in those regions impacted by drought, except Durango and Zacatecas recorded temperatures very close to normal. March 2012 was warmer than normal in Northeast Mexico, where Coahuila averaged 12.5 °C (54.5 °F) (+3.5 °C, the second warmest March), San Luis Potosi 15.1 °C (59.18 °F) (+3.3 °C, the second warmest), Nuevo Leon 13.6 °C (56.48 °F) (+3.3 °C, the third warmest March). In the South and Southeast, Quintana Roo averaged 21.2 °C (70.16 °F) (+3.1 °C, the record warmest March since 1971) and Oaxaca 17.2 °C (62.96 °F) (+3.0 °C, the fourth warmest); however, in late March drought was not a concern in those areas. On the other hand, only two states in the Northwest were below normal: Sonora averaged 7.0 °C (33.26 °F) (-0.8 °C seventh colder) and Baja California recording 6.8 °C (44.24 °F) (-0.25 °C the thirteenth colder). Across the rest of the country temperatures were very close to normal.

The area of exceptional drought (D4) was significantly reduced in March, falling from 3.63% in February to 1.26% in Durango, within Chihuahua and Coahuila and northern Nuevo Leon. Rainfall in February and March brought much of this improvement. Francisco I. Madero and La Boquilla reservoirs in Chihuahua remained at 40% and 48% capacity, respectively, which allowed the 2011 crop year to close successfully. However, the drought continues to advance into the Pacific Northwest: northern Sinaloa, southern Sonora and Chihuahua. This represents a serious threat because there was not enough recharge in aquifers over the last twelve months, and five reservoirs remain at less than 5% capacity; these reservoirs were at 40-60% capacity for March in 2010 and 2011.

Across the country there was a reduction in the drought affected areas from February to March. By month end the areas classified from abnormally dry (D0) to exceptional drought (D4) was 58.31%, moderate drought (D1) to exceptional was 46.2%, 32.18% from severe drought (D2) to (D4), and 13.31% from extreme (D3) to exceptional drought (D4).

According to reports from the National Forestry Commission, from January to March 2012, only 13,617 ha (33, 648 acre) of forest and grassland were burned nationwide; the second least amount of burned area on record, exceeded only by the same period in 2010 at 9,437 ha (23,319 acre). This was much less than the record number of forest fires recorded in the past for the January to March period, with 116,264 ha (28,7294 acre) in 1998, and 69,500 ha (17,1738) in 2003.